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(54) METHOD FOR COLLECTING SAMPLES OF LIQUID SPECIMENS FOR ANALYTICAL TESTING

VERFAHREN ZUR AUFNAHME VON FLÜSSIGEN PROBEN FÜR ANALYTISCHE TESTS

PROCEDE DE PRELEVEMENT D'ECHANTILLONS LIQUIDES A ANALYSER

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(73) Proprietor: **SALIVA DIAGNOSTIC SYSTEMS, INC.**
Vancouver, Washington 98682 (US)

(72) Inventors:
- **SCHRAMM, Willfried**
  Battle Ground, WA 98604 (US)
- **BURGESS-CASSLER, Anthony**
  Vancouver, WA 98661 (US)
- **HAISLEY, Charles**
  Boulder, CO 80303 (US)

(74) Representative: **du Pont, Jeroen**
Exter Polak & Charlouis B.V.
P.O. Box 3241
2280 GE Rijswijk (NL)

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Description

Technical Field

[0001] The field of the invention relates to a method for collecting, processing, and analyzing a liquid specimen in a self-contained system. More particularly, this invention relates to an apparatus and method for collecting, processing, and analyzing liquid specimens in a self-contained system.

Background Art

[0002] Chemical and biochemical analysis of liquids has been traditionally performed in specialized laboratories. However, the classical methods of analytical chemistry have been increasingly replaced by automated analyzers designed for the processing of well-defined specimens. These procedures are typically still conducted in highly specialized institutions by technicians trained in operating particular integrated instruments. In the recent past there has been an increasing trend to develop devices for the analysis of specimens in the field by non-trained personnel to address a specific analytical or diagnostic problem. In fully integrated devices sample collection, processing, and analysis are combined in such ways that they are non-obvious to the user but deliver a final non-coded readout. The degree of integration of all the procedures required for full analysis may vary in the descriptions of prior art.

[0003] Several devices and methods have been described to collect liquid specimens by means of fibrous or other absorbent materials for subsequent processing and analysis. Greenspan (U.S. Patent No. 4,409,988) teaches an apparatus for collecting cultures where the specimen is taken up by the absorbent tip of a swab which is then transferred into a culture medium. In a similar fashion, Nason (U.S. Patent No. 4,978,504 A) describes a specimen test unit for which the biological sample is also collected with a swab. For the collection of a specimen for medical diagnosis, Schluter (EP 0 382 905 A2) teaches the use of absorbent material for uptake of liquid and simultaneous separation of particulate matter. In yet another invention describing the collection of a body sample, Kremer (U.S. Patent No. 4,635,488), a device with a nib containing porous material for absorption is taught. The focus of Zawydski et al's teaching (EP 0 354 704) is on a device for expressing liquid absorbed on a medical swab. A number of devices have been described for collecting oral fluid using an absorbent pad and extracting the fluid from the pad either with a barrel-piston arrangement (U.S. Patent Nos. 4,418,702; 4,580,577; 4,774,962; 5,056,521) or by centrifugation (U.S. Patent No. 4,774,962).

[0004] WO 93/09431 describes a disposable assay device for assaying a sample comprising a body including a reaction chamber and a sample collector/dispenser, which body and collector/dispenser are non-detachably engaged or engageable.

[0005] WO 95/11621 discloses a device and method for collecting a volume of blood or other fluids in a capillary tube for diagnostic testing. More particular it relates to a device and method for collecting a fluid sample and introducing it into a sensing device for real time analysis.

[0006] All of these applications teach the use of absorbent material to take up a liquid to be analyzed. However, these methods of specimen collection have distinct limitations in a number of applications. Some of these application include, for example:

1. Absorption of molecules or components by the large surface area of absorbent materials if these molecules or components are to be quantitatively analyzed or if they are in a low concentration so that qualitative analysis is impaired (i.e., interference of non-specific binding).
2. Destruction or modification of molecules or components from the liquid to be analyzed by the absorbent materials (e.g., hemolysis of red blood cells in whole blood specimens, catalytic reactions, chemical reactions, etc.)
3. Inaccurate volume uptake, particularly for small volumes (e.g. microliters) and for viscous liquids (e. g. whole blood).
4. Adjustment of hydrophilicity/lipophilicity between the absorbent material and the liquid to be taken up (i.e., non-wettability).
5. Limited capability for expression/desorption of liquid taken up by absorbent materials, particularly for highly viscous liquids (i.e., incomplete recovery of liquid).

Disclosure of Invention

[0007] An object of the present invention is to provide a method for collecting liquid specimens for analytical testing.

[0008] Another object of the present invention is to provide a method for collecting liquid specimens utilizing sample containers with open capillaries for the collection of liquid specimens for further analyses.

[0009] An even further object of the present invention is to provide a method for analyzing bodily fluids in a self-contained unit.

[0010] Also an object of the present invention is to provide a self-contained analyzing kit for the testing of liquid specimens, particularly bodily fluids.

[0011] More particularly, the present invention provides a method for collecting samples of a liquid specimen for analytical testing comprising the steps of: bringing into contact with a liquid specimen an open capillary end of a sample container and forcing said specimen into said capillary, the sample container having an open top with a chamber disposed between said capillary end and said open top, said chamber including means there-

in for analytical testing; placing said capillary end into a vial containing an analytical testing reagent; mixing said liquid specimen with said reagent; and, forcing said liquid specimen and said reagent through said capillary end into the chamber whereby the liquid specimen and said reagent are analyzed.

[0012] Even more particularly, the present invention provides a self-contained unit for collecting and analyzing samples of liquid specimen including a sample container having an open capillary end and an open top with a chamber disposed therebetween, said chamber including means therein for analytical testing; and, a vial having a sealed top end, said top end being of preselected size to receive the lower end of said sample container in a substantially air tight arrangement upon being penetrated by said capillary end.

[0013] In the use of the term "capillary", such term will be used in the description of this invention in a broad definition insofar as the shape of the capillary may vary. The capillary will be defined as the mechanism of taking up liquid and the filling of a suitable open space as a result of surface tension between the liquid and the surface of the container.

[0014] Accordingly, other objects, features and advantages of the present invention will be apparent by reference to the following description of preferred embodiments, drawings and claims.

Brief Description of Drawings

[0015] A better understanding of the present invention may be obtained from the following detailed description of the preferred embodiments described in connection with the accompanying drawings wherein:

Figure 1 is a perspective view of one preferred sample container of the present invention;
Figure 2 is a perspective view of the sample container of Figure 1 with a test strip for analysis inserted therein;
Figure 3 is a perspective view of the sample container of Figure 1 shown in contact with a liquid specimen source;
Figure 3a is an enlarged side view of the capillary end of the sample container in contact with the liquid specimen source of Figure 3;
Figure 4 is a perspective view of a preferred sample collecting kit of the present invention;
Figure 5 is a perspective view of the sample container and reagent vial of Figure 4 with the capillary end of the sample container being inserted into the reagent vial;
Figure 6a is a perspective view of a capillary end of the sample container of Figure 1;
Figure 6b is a capillary end of another preferred sample container;
Figure 6c is a capillary end of even another preferred sample container of the present invention;
Figure 7 is a perspective view of another preferred sample collecting kit of the present invention;
Figure 8 is a perspective view of the sample kit of Figure 7 showing two reagent vials in contacting relation; and,
Figure 9 is a perspective view of the kit of Figure 7 with the sample container in contacting relation with the two reagent vials.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] As shown in Figure 1, a sample container 5 is provided with a capillary 3 having an open capillary end 4 and an open top 9 with a chamber 7 disposed therebetween.

Variations in the shape of the container 5, the position of the open top 9, as well as the size and shape of the capillary 3 may vary depending upon the particular liquid specimens to be analyzed. For example, with the collection of a small volume, that is from 1 to 5 microliters, a narrow capillary 3, as best shown in Figure 6a, with a relatively small capillary opening 4 is advantageous. However, for the collection of larger volumes, that is for 10 to 25 microliters of, for example, whole blood, a capillary with a larger opening 28, as shown in Figure 6b, is preferred.

Moreover, as shown in Figure 6b, the larger opening 28 may be built into the chamber 7 without forming a separate part therefrom. Also, for use in other applications, such as the collection of liquids with high surface tensions on certain solid surfaces which includes, for example, oils or syrups, or the like, a specially shaped capillary, such as shown in Figure 6c, may be appropriate. As shown in Figure 6c an indentation or capillary passageway 30 within the chamber 7 may be used to facilitate the identification of proper filling wherein the filling of the narrow passage of the indentation 30 can be easily seen by the user. Moreover, extension into a funnel-like shape 32 filling beyond the narrow passage indentation 30 takes place only reluctantly, depending upon the surface tension of the liquid, and a volume of the liquid with a high surface tension can be collected with relatively high accuracy. For other applications, a larger volume of liquid is required for analyses. In this instance, a wider opening of the capillary such as 28 and 31 in Figs. 6b and 6c is desirable. Only if the entire opening is covered with liquid, liquid will rise into the capillary thus discouraging the collection of an insufficient volume of blood. A conically shaped capillary, as shown in Figure 6c provides the advantage that the filling of the capillary with a predefined volume can be readily seen.

[0017] As best shown in Figure 2, the chamber 7 accommodates a test strip 12 for analysis of the bodily fluid to be analyzed. These test strips are well known in the prior art. These include test strips containing immunochemical reagents and designed not to require handling for performance as set forth in U.S. Patent No.

4,900,663; U.S. Patent No. 5,030,558; U.S. Patent No. 5,039,607 and U.S. Patent No. 4,999,285. Moreover, analysis may include non-immunochemical techniques for analyte detection using inorganic chemical reactions such as those described in the scientific literature, such as, Fiegl, Frit, *Spot Tests in Inorganic Analysis, 6th Edition, Elsevier Publishing Co., New York, 1972;* organic chemical reactions as taught in Fiegl, Frit, *Spot Tests in Organic Analysis, 7th Edition, Elsevier Publishing Co., New York, 1966;* chelating reactions as taught in Braibanti, A., Editor, *Bioenergetics and Thermodynamics: Model Systems - Synthetic and Natural Chelates and Macrocycles as Models for Biological and Pharmaceutical Studies,* D. Reidel Publishing Co., Boston 1980; colorimetric reactions as taught in Snell F. and Snell *C., Colorimetric Methods of Analysis,* Vols. 1-4AAA, Van Nostrand Reinhold Co., New York, 1967-74; and enzyme electrodes as taught by Senda et al., U.S. Patent No, 4,820,399.

[0018] As shown in Figure 3, the capillary 3 of the sample container 5 is brought into contact with a liquid by touching the liquid with the capillary open end 4. The liquid specimen, for example, a bodily fluid to be analyzed is shown as a drop of blood identified by the number 15 which is obtained by pricking a finger tip 14 with a sharp object, such as a medical lancet. The dimensions of the capillary 3 and the surface tension of the liquid determine the extension of the upper meniscus 18 in the capillary, as shown in Figure 3a, and, consequently, the volume of the liquid picked up.

[0019] As shown in Figs. 4 and 5, the liquid in the capillary 3 is diluted and flushed into the chamber 7 of the sample container 5 with another solvent by forcing the capillary through a septum 22 and subsequently into a solvent (buffer) vial 20. The solvent may be an aqueous or non-aqueous medium, for example, such as a buffer solution. The buffer solution may be contained in the buffer vial 20 that is sealed with a penetrable foil, as the septum 22. The sample container 5 is provided with an inwardly extending portion 6 that fits air-tight into the vial 20 thus inducing a pressure that flushes the content of the vial 20 through the capillary 3. The resulting liquid/buffer mixture enters the chamber 7 where it can be analyzed. For example, in using immunochromatographic test strip 12 for analyzing the liquid/buffer mixture as indicated by lines 24 in Figure 5, an indication as a control and reaction indicator can be generated such as those described in U.S. Patent Nos. 4,299,916; 4,235,601; and, 5.141,850.

[0020] In another embodiment of the present invention, as shown in Figs. 7-9, a sample kit may be provided with more than one capillary to perform certain analytical and processing procedures. One preferred sample kit as shown in Figure 7 consists of three members, a sample container 37, an auxiliary container 39 and a vial 43 containing a liquid, such as, for example, a buffer solution. The auxiliary container 39 is provided with a second capillary end 42 and a seal 40 with a vent 41 therein. The auxiliary container 39 is also provided with an indented portion, identified by the numeral 38, for an air tight seal with the vial 43 upon contact between the auxiliary container 39 and the vial 43.

[0021] In Figure 8 is shown the first step in the use of the sample test kit of Figure 7 wherein the capillary 42 of the auxiliary container 39 is brought into contact with the solution in the vial 43 by inserting of the capillary 42 through a penetrable foil 44. The capillary 42 fills with liquid if the seal 40 has a vent 41, as shown, relieving the pressure therein. Alternatively, if it is advisable that the seal 40 does not have a vent to prevent contact of the contents within the vial 43, the seal 40 may be removed before the capillary 42 is filled with the solution from the vial 43. Also, the auxiliary container 39 may contain dried reagents therein for further reactions. As shown in Figure 8, the auxiliary container 39 is pressed into the vial 43 with the contents of a liquid specimen from the capillary 42 being pressed into the interior of the auxiliary container 39 and mixes with the liquid content of the vial 43. If the auxiliary container 39 contains dried or solid reagent, for example, these are reconstituted with the liquid content of vial 43 and a reaction is initiated between the liquid content, the liquid specimen from the capillary 42 of the auxiliary container 39 and the dry reagents in the auxiliary container 39.

[0022] As shown in Figure 9, the next step in taking a sample with the sample kit as shown in Figure 7, a second liquid can be sampled with the capillary 3 of the sample container 37. This sample container 37 is subsequently pressed into the combined containers 39 and 43, thus mixing the combined liquids in auxiliary container 39 with the second liquid in the capillary 3. This combined mixture can then be analyzed by means of analytical devices contained in the sample container 37, such as the immunochromatographic test strips 12 which develop indicator lines 24. It is recognized that in the embodiment described in Figs. 7-9 either of the liquids contained in capillary 3 or 42 may be the liquid specimen, such as a bodily fluid, to be tested and the other liquid may be an additional reagent that is required for the analytical reaction in a predefined volume. In a variation of this embodiment, both of the liquids in the capillaries 3 and 42 may be evaluated together, for example, for compatibility testing. In even another variation of this embodiment, the capillary 3 of the sample container 37 may not be filled at all, for example, if a two-step reaction is required for analyses.

[0023] It is realized that other variations and modifications of the preferred embodiment are possible without departing from the scope of the present invention. And, it is not intended that the aforementioned discussion in any way limits the scope of the present invention, as set forth in the appended claims.

Claims

1. A method for collecting a sample of a liquid specimen (15) for analytical testing comprising the steps of:

   a. bringing into contact with a liquid specimen (15) an open end (4, 28, 31) of a capillary (3) of a sample container (5) and forcing said specimen (15) into said open end (4, 28, 31), said sample container (5) having an open top (9) with a chamber (7) disposed between said capillary (3) and said open top (9), said chamber (7) including means (12) therein for analytical testing;
   b. placing said capillary (3) into a vial (20) containing an analytical testing reagent;
   c. mixing said liquid specimen (15) with said reagent; and
   d. forcing said liquid specimen (15) and said reagent through said capillary (3) into said chamber (7) whereby said liquid specimen (15) and said reagent are analyzed.

2. The method of Claim 1, said liquid specimen (15) being bodily fluids.

3. The method of Claim 1, said forcing including penetrating a penetrable foil seal (22) on said vial (20), said sample container (5) fitting within said vial (20) in an air-tight arrangement.

4. The method of Claim 3, said sample container (5) having an inwardly extending portion (6), said inwardly extending portion (6) fitting within said seal (22) at said penetrating.

5. The method of Claim 1, wherein said vial (20) contains a penetrable foil seal (22) over an opening in a top thereof and said sample container (5) includes means (6) to provide an air tight seal when said capillary (3) is received in said penetrable foil (22).

6. A sample collecting kit comprising a sample container (5) having a capillary (3, 30) with a first open end (4, 28, 31) and a first open top (9) with a first chamber (7) disposed therebetween, said chamber (7) including means (12) therein for analytical testing; and, a vial (20) having an open end for receiving said capillary (3, 30) therein, said vial (20) including a reagent therein.

7. The sample kit of Claim 6, said vial (20) having a penetrable foil (22) over said open end of said vial (20).

8. The sample kit of Claim 7, said sample container (5) including means (6) to form an air tight seal with said penetrable foil (22) upon receipt of said capillary (3).

9. The sample kit of Claim 8, said sample container (5) having an inwardly extending portion (6), said inwardly extending portion (6) engageable with an opening in said penetrable foil (22) to form an air-tight seal between said sample container (5) and said vial (20).

10. The sample kit of Claim 6, said chamber (7) having a capillary (28, 30) disposed therein.

11. The sample kit of Claim 6, said chamber (7) having a funnel-shaped opening (32) in a lower end, said funnel-shaped opening (32) opening outwards from said chamber (7) and opposite said opening (32) a capillary (3, 30) extending inwardly into said chamber (7).

12. A sample kit according to claim 6, for collecting bodily fluids further comprising:

    an auxiliary container (39) having a second open end adapted to receive said first capillary end (3) and an opposed end to said second open end having a second capillary end (42) with a second chamber disposed therebetween.

13. The sample kit of Claim 12, said auxiliary container (39) having a penetrable foil seal (40) covering said second open end with a vent (41) therein.

14. The sample kit of Claim 12, said second open end having a penetrable foil covering said second open end, said penetrable foil covering said second open end, said penetrable foil being absent a vent (41).

15. The sample kit of Claim 12, said sample container including means (6) to provide an air tight seal with said second open end.

16. The sample kit of Claim 15, said means (6) to provide an air-tight seal with said second open end being an inwardly extending portion (6) in said sample container (37).

17. The sample kit of Claim 12, said auxiliary container (39) including means (38) to provide an air tight seal with said third open top of said vial (43).

18. A method according to Claim 1, comprising the steps of:

    a. bringing into contact with a liquid specimen (15) a second capillary end (42) of an auxiliary container (39) and forcing said liquid specimen

(15) into said second capillary end (42), said auxiliary container (39) having a second open top with a chamber disposed between said second capillary end (42) and said second open top;
b. placing said second capillary end (42) into a vial (43) containing an analytical testing reagent;
c. mixing said liquid specimen (15) with said reagent;
d. bringing into contact with said second open top of said auxiliary container (39) a first capillary end (3) of a sample container (5, 37) said sample container (5, 37) having a first open top (9) with a chamber (7) disposed between said first capillary end (3) and said first open top (9), said chamber 7 including means (12) therein for analytical testing; and,
e. forcing said liquid specimen (15) and said reagent through said first capillary end (3) into said chamber (7) whereby said liquid specimen and said reagent are analyzed.

19. The method of Claim 18, said liquid specimen (15) being bodily fluids.

20. The method of Claim 18, said forcing said liquid specimen (15) into said second capillary end (42) including penetrating a penetrable foil seal (44) on said vial (43), said auxiliary container (39) fitting within said vial (43) in an air-tight arrangement.

21. The method of Claim 20, said auxiliary container (39) having an inwardly extending portion (38), said inwardly extending portion (38) fitting within said seal (44) on said vial (43) at said penetrating.

22. The method of Claim 18, said forcing said liquid specimen (15) and said reagent including inserting said first capillary end (3) into said second open end of said auxiliary container (39), said sample container (5, 37) fitting within said second open end of said auxiliary container (39) in an air-tight arrangement.

23. The method of Claim 22, said sample container (5, 37) having an inwardly extending portion (6), said inwardly extending portion (6) fitting within said second open end of said auxiliary container (39).

24. The method of Claim 18, said reagent being a liquid.

25. The method of Claim 18, said reagent being a solid reagent.

Patentansprüche

1. Verfahren zum Auffangen einer Probe eines flüssigen Prüfobjekts (15) zum analytischen Testen, das die folgenden Schritte umfaßt:

   a. Berühren des flüssigen Prüfobjekts (15) mit einem offenen Ende (4, 28, 31) einer Kapillareinrichtung (3) eines Probenbehälters (5) und Drängen des Prüfobjekts (15) in das offene Ende (4, 28, 31), wobei der Probenbehälter (5) ein offenes Kopfende (9) mit einer zwischen der Kapillareinrichtung (3) und dem offenen Kopfende (9) angeordneten Kammer (7) aufweist, die ihrerseits Mittel (12) zum analytischen Testen enthält;
   b. Anordnen der Kapillareinrichtung (3) in einem Glasfläschchen (20), das ein Reagens für das analytische Testen enthält;
   c. Mischen des flüssigen Prüfobjekts (15) mit dem Reagens; und
   d. Drängen des flüssigen Prüfobjekts (15) und des Reagens' durch die Kapillareinrichtung (3) in die Kammer (7), wobei das flüssige Prüfobjekt (15) und das Reagens analysiert werden.

2. Verfahren nach Anspruch 1, bei dem das flüssige Prüfobjekt (15) eine Körperflüssigkeit ist.

3. Verfahren nach Anspruch 1, bei dem das Drängen das Durchdringen einer durchdringbaren Folienversiegelung (22) auf dem Glasfläschchen (20) umfaßt, wobei der Probenbehälter (5) in das Glasfläschchen (20) in einer luftdichten Anordnung eingepaßt ist.

4. Verfahren nach Anspruch 3, bei dem der Probenbehälter (5) einen sich nach innen erstreckenden Abschnitt (6) aufweist, der beim Durchdringen in die Versiegelung (22) eingepaßt wird.

5. Verfahren nach Anspruch 1, bei dem das Glasfläschchen (20) über einer Öffnung in seinem Kopfende eine durchdringbare Folienversiegelung (22) enthält und der Probenbehälter (5) Mittel (6) aufweist, die eine luftdichte Versiegelung schaffen, wenn die Kapillareinrichtung (3) in der durchdringbaren Folie (22) aufgenommen ist.

6. Probensammelsatz mit einem Probenbehälter (5), der eine Kapillareinrichtung (3, 30) mit einem ersten offenen Ende (4, 28, 31) und einem ersten offenen Kopfende (9) und einer dazwischen angeordneten ersten Kammer (7) aufweist, wobei die Kammer (7) Mittel (12) zum analytischen Testen enthält; und mit einem Glasfläschchen (20), das ein offenes Ende für die Aufnahme der Kapillareinrichtung (3, 30) aufweist und ein Reagens enthält.

7. Probensatz nach Anspruch 6, bei dem das Glasfläschchen (20) auf seinem offenen Ende eine durchdringbare Folie (22) aufweist.

8. Probensatz nach Anspruch 7, bei dem der Probenbehälter (5) Mittel (6) enthält, die mit der durchdringbaren Folie (22) bei der Aufnahme der Kapillareinrichtung (3) eine luftdichte Versiegelung bilden.

9. Probensatz nach Anspruch 8, bei dem der Probenbehälter (5) einen sich nach innen erstreckenden Abschnitt (6) aufweist, der mit einer Öffnung in der durchdringbaren Folie (22) in Eingriff bringbar ist, um zwischen dem Probenbehälter (5) und dem Glasfläschchen (20) eine luftdichte Versiegelung zu bilden.

10. Probensatz nach Anspruch 6, bei dem die Kammer (7) eine darin angeordnete Kapillareinrichtung (28, 30) aufweist.

11. Probensatz nach Anspruch 6, bei dem die Kammer (7) in einem unteren Ende eine trichterförmige Öffnung (32), die von der Kammer (7) nach außen mündet, und gegenüber der Öffnung (32) eine in die Kammer (7) sich erstreckende Kapillareinrichtung (3, 30) aufweist.

12. Probensatz nach Anspruch 6 zum Auffangen von Körperflüssigkeiten, der ferner umfaßt:

    einen Hilfsbehälter (39) mit einem zweiten offenen Ende, das das erste Ende der Kapillareinrichtung (3) aufnehmen kann, und einem dem zweiten offenen Ende gegenüberliegenden Ende, das ein zweites Ende (42) der Kapillareinrichtung aufweist, wobei dazwischen eine zweite Kammer angeordnet ist.

13. Probensatz nach Anspruch 12, bei dem der Hilfsbehälter (39) eine durchdringbare Folienversiegelung (40) aufweist, die das zweite offene Ende abdeckt und in der sich ein Belüftungsloch (41) befindet.

14. Probensatz nach Anspruch 12, bei dem das zweite offene Ende eine durchdringbare Folie aufweist, die das zweite offene Ende abdeckt, wobei die durchdringbare Folie das zweite offene Ende abdeckt und kein Belüftungsloch (41) aufweist.

15. Probensatz nach Anspruch 12, bei dem der Probenbehälter Mittel (6) aufweist, die eine luftdichte Versiegelung mit dem zweiten offenen Ende schaffen.

16. Probensatz nach Anspruch 15, bei dem die Mittel (6) zum Schaffen einer luftdichten Versiegelung mit dem zweiten offenen Ende ein sich in den Probenbehälter (37) erstreckender Abschnitt (6) sind.

17. Probensatz nach Anspruch 12, bei dem der Hilfsbehälter (39) Mittel (38) aufweist, die eine luftdichte Versiegelung dem dritten offenen Kopfende des Glasfläschchens (43) schaffen.

18. Verfahren nach Anspruch 1, das die folgenden Schritte umfaßt:

    a. Berühren des flüssigen Prüfobjekts (15) mit einem zweiten Kapillarende (42) eines Hilfsbehälters (39) und Drängen des flüssigen Prüfobjekts (15) in das zweite Kapillarende (42), wobei der Hilfsbehälter (39) ein zweites offenes Kopfteil besitzt und wobei zwischen dem zweiten Kapillarende (42) und dem zweiten offenen Kopfteil eine Kammer angeordnet ist;
    b. Anordnen des zweiten Kapillarendes (42) in einem Glasfläschchen (43), das ein Reagens für das analytische Testen enthält;
    c. Mischen des flüssigen Prüfobjekts (15) mit dem Reagens;
    d. Berühren des zweiten offenen Kopfendes des Hilfsbehälters (39) mit einem ersten Kapillarende (3) eines Probenbehälters (5, 37), wobei der Probenbehälter (5, 37) ein erstes offenes Kopfende (9) aufweist, wobei die Kammer (7) zwischen dem ersten Kapillarende (3) und dem ersten offenen Kopfende (9) angeordnet ist und Mittel (12) zum analytischen Testen enthält; und
    e. Drängen des flüssigen Prüfobjekts (15) und des Reagens durch das erste Kapillarende (3) in die Kammer (7), wobei das flüssige Prüfobjekt und das Reagens analysiert werden.

19. Verfahren nach Anspruch 18, bei dem das flüssige Prüfobjekt (15) eine Körperflüssigkeit ist.

20. Verfahren nach Anspruch 18, bei dem das Drängen des flüssigen Prüfobjekts (15) in das zweite Kapillarende (42) das Durchdringen einer durchdringbaren Folienversiegelung (44) auf dem Glasfläschchen (43) umfaßt, wobei der Hilfsbehälter (39) in das Glasfläschchen (43) in einer luftdichten Anordnung eingepaßt wird.

21. Verfahren nach Anspruch 20, bei dem der Hilfsbehälter (39) einen sich nach innen erstreckenden Abschnitt (38) aufweist, der beim Durchdringen in die Versiegelung (44) auf dem Glasfläschchen (43) eingepaßt wird.

22. Verfahren nach Anspruch 18, bei dem das Drängen des flüssigen Prüfobjekts (15) und des Reagens' das Einsetzen des ersten Kapillarendes (3) in das zweite offene Ende des Hilfsbehälters (39) umfaßt,

wobei der Probenbehälter (5, 37) in das zweite offene Ende des Hilfsbehälters (39) in einer luftdichten Anordnung eingepaßt wird.

23. Verfahren nach Anspruch 22, bei dem der Probenbehälter (5, 37) einen sich nach innen erstreckenden Abschnitt (6) aufweist, der in das zweite offene Ende des Hilfsbehälters (39) eingepaßt ist.

24. Verfahren nach Anspruch 18, bei dem das Reagens eine Flüssigkeit ist.

25. Verfahren nach Anspruch 18, bei dem das Reagens ein Festkörper-Reagens ist.

Revendications

1. Procédé pour prélever un échantillon d'un spécimen liquide (15) en vue de tests analytiques comprenant les étapes consistant à :

   a) amener une extrémité ouverte (4, 28, 31) d'un tube capillaire (3) d'un récipient à échantillon (5) en contact avec un spécimen liquide (15) et faire pénétrer ledit spécimen (15) dans ladite extrémité ouverte (4, 28, 31), ledit récipient à échantillon (5) ayant une partie supérieure ouverte (9), une chambre (7) étant disposée entre ledit tube capillaire (3) et ladite partie supérieure ouverte (9), ladite chambre (7) contenant des moyens (12) pour effectuer des tests analytiques ;
   b) placer ledit tube capillaire (3) dans un flacon (20) contenant un réactif de test analytique ;
   c) mélanger ledit spécimen liquide (15) avec ledit réactif ; et
   d) faire pénétrer ledit spécimen liquide (15) et ledit réactif, à travers ledit tube capillaire (3), dans ladite chambre (7) de telle manière que ledit spécimen liquide (15) et ledit réactif soient analysés.

2. Procédé selon la revendication 1, ledit spécimen liquide (15) étant des fluides corporels.

3. Procédé selon la revendication 1, ladite pénétration comprenant la pénétration d'une pellicule d'étanchéité pénétrable (22) présente sur ledit flacon (20) ledit récipient à échantillon (5) s'insérant dans ledit flacon (20) en un agencement étanche à l'air.

4. Procédé selon la revendication 3, ledit récipient à échantillon (5) comportant une partie s'étendant vers l'intérieur (6), ladite partie s'étendant vers l'intérieur (6) s'insérant dans ladite pellicule d'étanchéité (22) au moment de ladite pénétration.

5. Procédé selon la revendication 1, dans lequel ledit flacon (20) contient une pellicule d'étanchéité pénétrable (22) sur une ouverture dans une partie supérieure de celui-ci et ledit récipient à échantillon (5) comprend des moyens (6) pour réaliser un joint étanche à l'air lorsque ledit tube capillaire (3) est reçu dans ladite pellicule pénétrable (22).

6. Kit de prélèvement d'échantillon comprenant un récipient à échantillon (5) comportant un tube capillaire (3, 30) avec une première extrémité ouverte (4, 28, 31) et une première partie supérieure ouverte (9), une première chambre (7) étant disposée entre elles, ladite chambre (7) contenant des moyens (12) pour effectuer des tests analytiques ; et, un flacon (20) ayant une extrémité ouverte pour recevoir ledit tube capillaire (3, 30) dans celle-ci, ledit flacon (20) contenant un réactif.

7. Kit à échantillon selon la revendication 6, ledit flacon (20) comportant une pellicule pénétrable (22) sur ladite extrémité ouverte dudit flacon (20).

8. Kit à échantillon selon la revendication 7, ledit récipient à échantillon (5) comprenant des moyens (6) pour former un joint étanche à l'air avec ladite pellicule pénétrable (22) lors de la réception dudit tube capillaire (3).

9. Kit à échantillon selon la revendication 8, ledit récipient à échantillon (5) comportant une partie s'étendant vers l'intérieur (6), ladite partie s'étendant vers l'intérieur (6) pouvant être mise en prise avec une ouverture dans ladite pellicule pénétrable (22) pour former un joint étanche à l'air entre ledit récipient à échantillon (5) et ledit flacon (20).

10. Kit à échantillon selon la revendication 6, un tube capillaire (28, 30) étant disposé dans ladite chambre (7).

11. Kit à échantillon selon la revendication 6, ladite chambre (7) comportant une ouverture en forme d'entonnoir (32) dans une extrémité inférieure, ladite ouverture en forme d'entonnoir (32) s'ouvrant vers l'extérieur à partir de ladite chambre (7), et à l'opposé de ladite ouverture (32), un tube capillaire (3, 30) s'étendant vers l'intérieur dans ladite chambre (7).

12. Kit à échantillon selon la revendication 6 pour prélever des fluides corporels, comprenant en outre :

   un récipient auxiliaire (39) ayant une deuxième extrémité ouverte adaptée pour recevoir ladite première extrémité capillaire (3) et une extrémité opposée à ladite deuxième extrémité ouverte ayant une deuxième extrémité capillai-

re (42) avec une deuxième chambre disposée entre celles-ci.

13. Kit à échantillon selon la revendication 12, ledit récipient auxiliaire (39) comportant une pellicule d'étanchéité pénétrable (40) recouvrant ladite deuxième extrémité ouverte et comportant un évent (41) dans celle-ci.

14. Kit à échantillon selon la revendication 12, ladite deuxième extrémité ouverte comportant une pellicule pénétrable recouvrant ladite deuxième extrémité ouverte, ladite pellicule pénétrable recouvrant ladite deuxième extrémité ouverte, ladite pellicule pénétrable ne comportant pas d'évent (41).

15. Kit à échantillon selon la revendication 12, ledit récipient à échantillon comprenant des moyens (6) pour réaliser un joint étanche à l'air avec ladite deuxième extrémité ouverte.

16. Kit à échantillon selon la revendication 15, lesdits moyens (6) pour réaliser un joint étanche à l'air avec ladite deuxième extrémité ouverte étant une partie s'étendant vers l'intérieur (6) dans ledit récipient à échantillon (37).

17. Kit à échantillon selon la revendication 12, ledit récipient auxiliaire (39) comprenant des moyens (38) pour réaliser un joint étanche à l'air avec ladite troisième partie supérieure ouverte dudit flacon (43).

18. Procédé selon la revendication 1, comprenant les étapes consistant à :

a) amener une deuxième extrémité capillaire (42) d'un récipient auxiliaire (39) en contact avec un spécimen liquide (15) et faire pénétrer ledit spécimen liquide (15) dans ladite deuxième extrémité capillaire (42), ledit récipient auxiliaire (39) ayant une deuxième partie supérieure ouverte, une chambre étant disposée entre ladite deuxième extrémité capillaire (42) et ladite deuxième partie supérieure ouverte ;
b) placer ladite deuxième extrémité capillaire (42) dans un flacon (43) contenant un réactif de test analytique ;
c) mélanger ledit spécimen liquide (15) avec ledit réactif ;
d) amener une première extrémité capillaire (3) d'un récipient à échantillon (5, 37) en contact avec ladite deuxième partie supérieure ouverte dudit récipient auxiliaire (39), ledit récipient à échantillon (5, 37) ayant une première partie supérieure ouverte (9) avec une chambre (7) disposée entre ladite première extrémité capillaire (3) et ladite première partie supérieure ouverte (9), ladite chambre (7) contenant des moyens (12) pour effectuer des tests analytiques ; et
e) faire pénétrer ledit spécimen liquide (15) et ledit réactif, à travers ladite première extrémité capillaire (3), dans ladite chambre (7) de telle manière que ledit spécimen liquide et ledit réactif soient analysés.

19. Procédé selon la revendication 18, ledit spécimen liquide (15) étant des fluides corporels.

20. Procédé selon la revendication 18, ladite pénétration dudit spécimen liquide (15) dans ladite deuxième extrémité capillaire (42) comprenant la pénétration d'une pellicule d'étanchéité pénétrable (44) présente sur ledit flacon (43), ledit récipient auxiliaire (39) s'insérant dans ledit flacon (43) en un agencement étanche à l'air.

21. Procédé selon la revendication 20, ledit récipient auxiliaire (39) comportant une partie s'étendant vers l'intérieur (38), ladite partie s'étendant vers l'intérieur (38) s'insérant dans ladite pellicule d'étanchéité (44) présente sur ledit flacon (43) lors de ladite pénétration.

22. Procédé selon la revendication 18, ladite pénétration dudit spécimen liquide (15) et dudit réactif comprenant l'insertion de ladite première extrémité capillaire (3) dans ladite deuxième extrémité ouverte dudit récipient auxiliaire (39), ledit récipient à échantillon (5, 37) s'insérant dans ladite deuxième extrémité ouverte dudit récipient auxiliaire (39) en un agencement étanche à l'air.

23. Procédé selon la revendication 22, ledit récipient à échantillon (5, 37) comportant une partie s'étendant vers l'intérieur (6), ladite partie s'étendant vers l'intérieur (6) s'insérant dans ladite deuxième extrémité ouverte dudit récipient auxiliaire (39).

24. Procédé selon la revendication 18, ledit réactif étant un liquide.

25. Procédé selon la revendication 18, ledit réactif étant un réactif solide.

Fig. 1

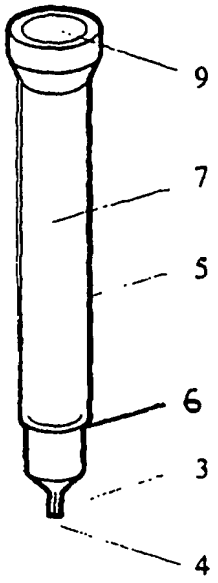


Fig. 2

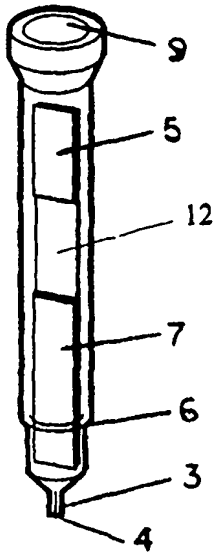


Fig. 3

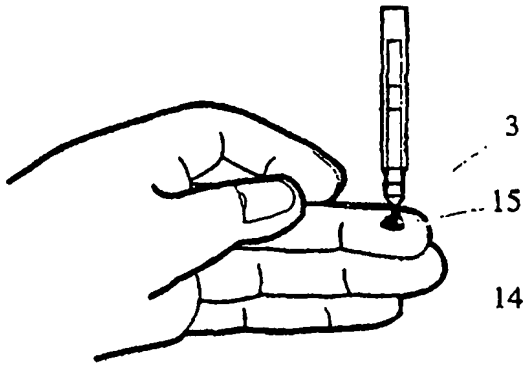


Fig. 3a

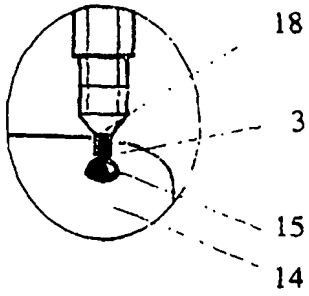


Fig. 4

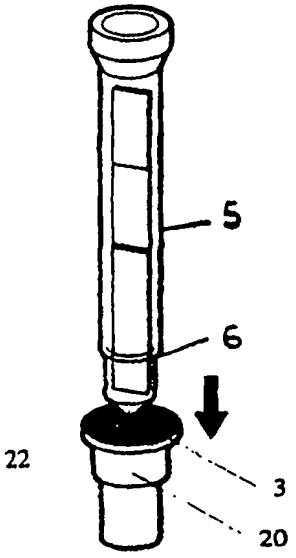
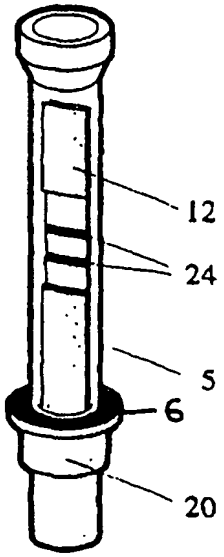


Fig. 5



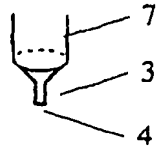


Fig. 6a

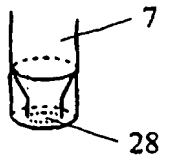


Fig. 6b

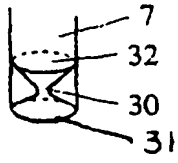


Fig. 6c

Fig. 7

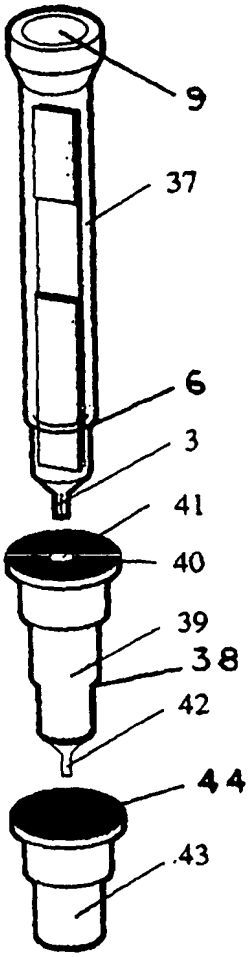


Fig. 8

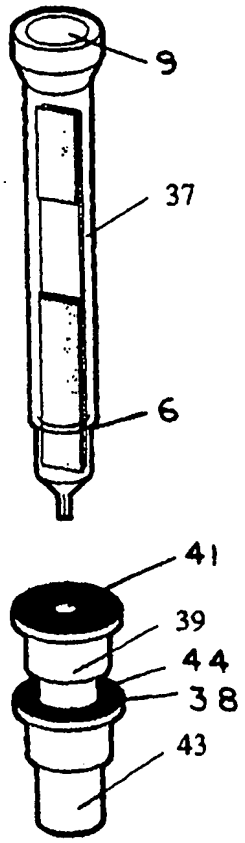


Fig. 9